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Universiti Putra Malaysia continues its tradition of producing inventions with a strong focus on agriculture. > 8 & 9

Working to boost agricultural industry

As one of the country's research universities, UPM showcases its innovative products to meet the needs of industry.

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RESEARCH and development is an integral part of any university, and Universiti Putra Malaysia continues its strong tradition of producing innovative research such as a fish disease diagnostic kit, organic fungicide and a specially designed 'box' using solar energy to kill pests.

The university has created over 1,800 intellectual properties just for this year.

Putra Science Park UPM Innovation Promotion and Marketing Division deputy director Dr Muhammad Fakri Zaky Jaafar says the university managed to licence 73 technologies over the years, which has generated roughly around RM40mil in revenue.

This, he says, is comparable to other reputable universities worldwide.

An Innovation Open Day was held recently to showcase the university's new products and solutions which are ready to be commercialised. Its theme was "Agriculture – Innovation – Business."

UPM Faculty of Agriculture dean Prof Dr Abdul Shukor Juraimi says the Innovation Open Day is not only to showcase what UPM has to offer industries.

"It also encourages open dialogue between researchers and the industry through sharing expertise.

"This type of discussion is important because it will help the researchers receive suggestions and know what the industry wants," he says.

Prof Abdul Shukor says the varsity does not just want its researchers' work to end up only in journals.

"We want to earn income using their research," he adds.

Detecting the virus

One of the products featured at the Innovation Open Day was a fish disease diagnostic kit.

Faculty of Veterinary Medicine fish pathology professor Prof Datuk Dr Mohamed Shariff Mohamed Din, together with his team of four, has created a simple diagnostic kit to detect the Infectious Spleen and Kidney Necrosis Virus (ISKNV).

ISKNV-infected fish show no symptoms. That is until they are faced with environmental stress such as temperature changes. Then, they just go belly up.

This virus not only threatens the fish's life; it threatens the livelihoods of Malaysian fisheries.

Prof Mohamed Shariff explains that the virus can infect both freshwater and marine fish. If fish are infected, they have to be destroyed and the pond cleaned.

Popular tropical aquarium fishes like the platy, Ram cichlid, zebrafish and swordtail are favourite homes for the virus.

The kit, called Lamp For The Detection Of ISKNV, is easy enough for farmers to use at their fish farms. Lamp stands for "loop-mediated isothermal amplification".

"There's no need to send samples to a laboratory and wait for the results," adds Prof Mohamed Shariff. In layman's terms, it means a simple and inexpensive diagnostic method for the detection of ISKNV.

Prof Mohamed Shariff says all that needs to be done is to extract a bit of kidney or spleen tissue from the fish and add it to the reaction mixture included in the kit.

"You then heat it up inside a water bath at 61°C to 65°C, add in the given dye and wait for the positive or negative result. It is user-friendly and economical, plus it saves time," he says. The entire process takes less than an hour. The sample will turn yellow if it's positive or remain orange if there is no sign of the virus.

"All a person needs is simple training and they can do this on their own at their aquaculture farms," he says.

Damaging disease

Malaysians consume more than 150,000 tonnes of papayas a year.

That's a lot of money to be made from growing and harvesting papayas.

Just because the papayas have been safely harvested, it doesn't mean that they're safe from harm.

They still face post-harvest disease, which are diseases that infect after crops have been collected.

One such troubling post harvest disease is Anthracnose disease, which is caused by a fungus.

The fungus causes ugly black spots that affect the fruit's market value. The fungus also infects other produce such as mangoes, bananas and even chillies.

It is quite a common disease with a 90% to 98% infection incidence, and although it can be treated with chemicals, it isn't a possible solution for organic farmers.

To help solve the organic farmers' woes, UPM Department of Plant Protection Assoc Prof Dr Kamaruzaman Sijam and his former student Dr Farah Farhanah Haron, together with UPM Agriculture Department deputy dean (research and postgraduate studies) Prof Dr Dzolkifli Omar and UPM Chemistry Department professor Dr Mawardi Rahmani (now retired) came up with an organic fungicide.

They spent two years visiting post-harvest factories and working in the laboratory to develop the fungicide.

Their product, known as Allamanda-derived bio-fungicide, is an eco-friendly nanoemulsion that is safe for both humans and animals.

Dr Farah Farhanah says their product uses an extract from the leaves of the Jamaican sunset plant (*Allamanda cathartica*).

"It's also easily absorbed because it's a nanoemulsion," she says, explaining that nanoemulsions are tiny enough to pass through the papaya's skin and kill the fungus.

She says there is no need to worry about unpleasant side-effects.

"It's plant-derived and organic. We also did a toxicology test and found the product to be safe," she explains.

Dr Farah Farhanah says the biofungicide can be used for a few other fungi, although it is specific to the one that causes Anthracnose.

She was happy that several local companies showed an interest in their product at the Innovation Open Day.

Boxed in

A team of scientists has come up with a box to safely and effectively kill insects that infest grains and seeds.

UPM Agriculture Faculty Plant Protection Department associate professor Dr Rita Muhamad Awang says the box is specially designed to make use of solar energy to kill the pests.

"The heat is trapped inside the sealed box. It is called 'physical pest control'," says the team leader.

The box forms both a barrier and uses high temperature to destroy the bugs. The box is cost-effective because solar energy is free and does not require any electricity.

"About 40 to 45 minutes is needed to destroy the adult, the larvae and eggs. After that, the dead insects and their eggs can be sieved out," she says.

She says the group came up with the idea to meet the needs of organic farmers who could not rely on chemicals to treat their crops. The patented device isn't available on the market yet.

"But if a company is interested in this technology and mass produces it, the box can be sold for about RM50," she says.

The box is suitable for dry agricultural products such as rice, beans and even coffee.

Using heat to destroy the pests does not affect the seed quality.

"There is still 100% germination after you treat them," she says.

The ideal capacity for the solar heater box is 8kg but Dr Rita says the box can accommodate up to 10kg.

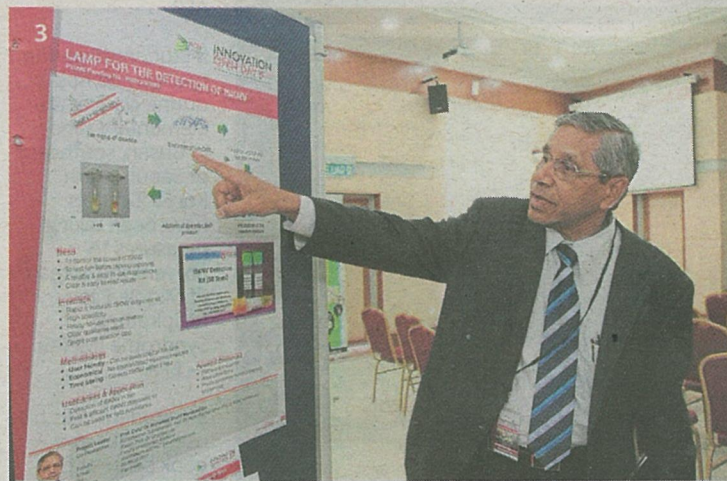
The box also prevents reinfestation as long as the produce is kept sealed.

"This beats the old method of laying out the grains on a plastic mat and waiting for the insects to scatter," she says.



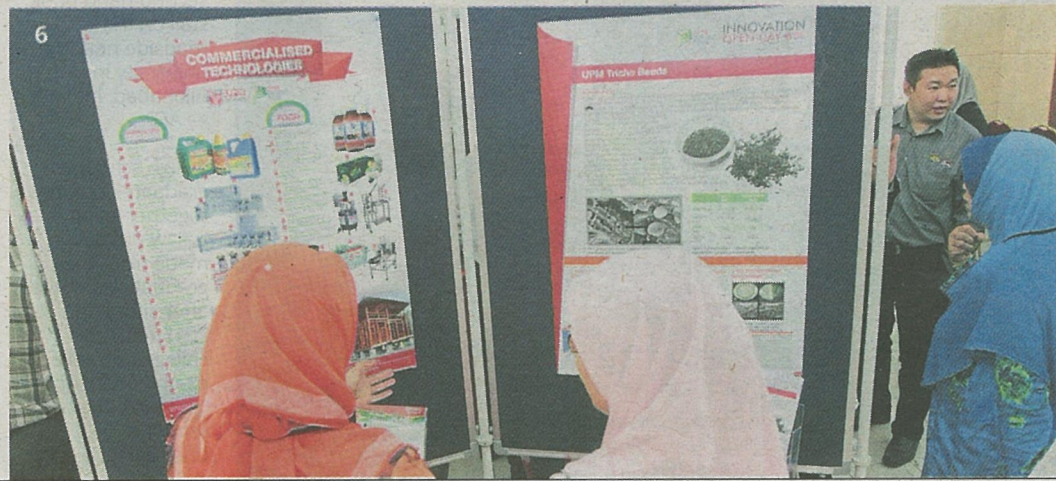
1 Unsightly spots: Dr Farah Farhanah pointing out the damage that can be caused by the fungus on fruits.

2 This is how it works: Dr Farah Farhanah (right) and her project leader Prof Kamaruzaman (left) explaining the benefits of their biofungicide to visitors.



3 Keeping the fish healthy: Prof Mohamed Shariff explaining the steps needed to use the ISKNV detection kit.

4 Keeping the momentum: Dr Muhammad Fakri says the university managed to licence 73 technologies which has generated around RM40mil in revenue.



5 Bye-bye bugs: Dr Rita (left) explaining the benefits of the solar heater box to her students Dr Gilal Arfaa Ahmad (centre) and Dr Manjeri Gnanasegaram.

6 Sharing session: Potential industry partners exploring the products on display at UPM's Innovation Open Day 2015.